robogonio

Quick. Precise. Highly flexible.

opsira

www.robogonio.com

One system, six good reasons

What the robogonio can do.

1. Highest flexibility
   Goniophotometry in near and far field, various detector systems – combined in one instrument.
2. Extremely quick scans
   The class L photometer reduces the measurement time. This means for example: Hemisphere within approximately two minutes.
3. Variable sizes
   The robogonio is available in seven basic variants (payloads of 6, 10, 16, 30, 60, 120, 240 kg), special models of up to 1,000 kg are possible. Our experienced partner for robotics: KUKA Roboter GmbH.
4. Maximum precision
   The robogonio offers the highest angle repeatabilities of 0.005° along with a photometer of the highest class (L).
5. Intuitive operation
   The robogonio is easy to use. Complicated and error-prone measurements with mirror goniophotometers are a thing of the past.
6. All-round carefree package
   We are pleased to support you – from the complete planning of your system to competent after-sales support.

Measurements with the robogonio at a glance

Everything is possible.

- With its six axes, the robogonio combines several goniophotometer types in a single instrument (DIN EN 5032-1, DIN EN 13032-1, CIE 121). Especially types 1.1, 1.2, and 1.3 are dead easy for the robogonio. In these types, the detector is stationary while the test piece (light source, luminaire, display…) rotates around its vertical and horizontal axes.
- In the far field, the robogonio measures the luminous intensity distributions of luminaires. Conventional far-field data such as EULUMDAT or IES are generated directly.
- In the near field, the robogonio generates ray data of light sources with high precision, and even polychromatic depending on the detector. Far-field data can be calculated directly from the ray data.
- Angular dependent luminance measurements, for example, form the basis for glare ratings.
- Mounted on the robot arm, the detector can scan any geometry, including planes. This allows a quick evaluation of the light distribution of luminaires and headlights.

Safety & innovation under high time pressure

The robogonio for automotive.

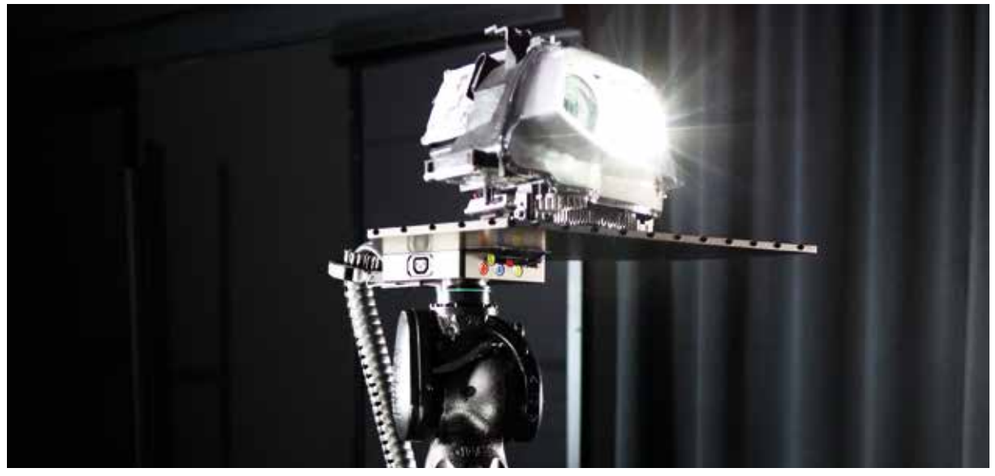
In the automotive industry, two aspects of photometric measurement are of particular importance: Firstly, the demand for extremely quick and authoritative results. Secondly, the possibility to effect the measurements with the finest angular resolutions so that the tests comply with the applicable standards.

The robogonio meets both of these requirements perfectly. The high-speed photometer reduces the time required for classic goniometric measurements in the HV system (ECE, SAE) to a few minutes. Also, the robogonio permits angular resolutions of 0.01°. This enables the precise observance of the cut-off line.

But that's not all: Due to its spatial flexibility, the robogonio can cover different headlight functions such as high beam, low beam, or direction indicators around different centres of rotation in a single measuring run. To this purpose, the robogonio supplies the headlight directly via an optional 13-channel mounting adapter, either through the integrated power supplies or through BUS signals. All measuring points according to ECE and SAE are scanned by the system automatically.

By the way

For measuring elongated light guides, the robogonio can be equipped with a high-resolution camera. Instead of doing complicated measurements in individual steps, the robogonio scans the light guide and conveniently provides high-precision results on the luminance distribution.



Shorter F&E cycles, EULUMDAT & IES in view

The robogonio for luminaire manufacturers.

Constantly launching new variants of luminaires, easily providing light planners with far-field data (IES, EULUMDAT), and quickly generating the required LED data. robogonio stands for a measuring solution that fulfils all requirements.

First, the luminaire warms up in operating position; the run-up curve (DIN EN 13032-4) is provided by the auxiliary photometer. Then the luminous intensity distribution can be measured through any angle in the C-plane system since the robogonio can move the luminaire freely in space.

Color-over-angle measurements are also possible with the optional spectrometer. So optics designers can determine how the color changes at certain angles, and whether unwanted color effects occur. Another important topic is the measurement of the total luminous flux in relation to the consumed electrical power. Luminous flux efficiency in lumen/watt and energy efficiency classes can be determined directly.

By the way

The robogonio also helps with the glare rating of luminaires.

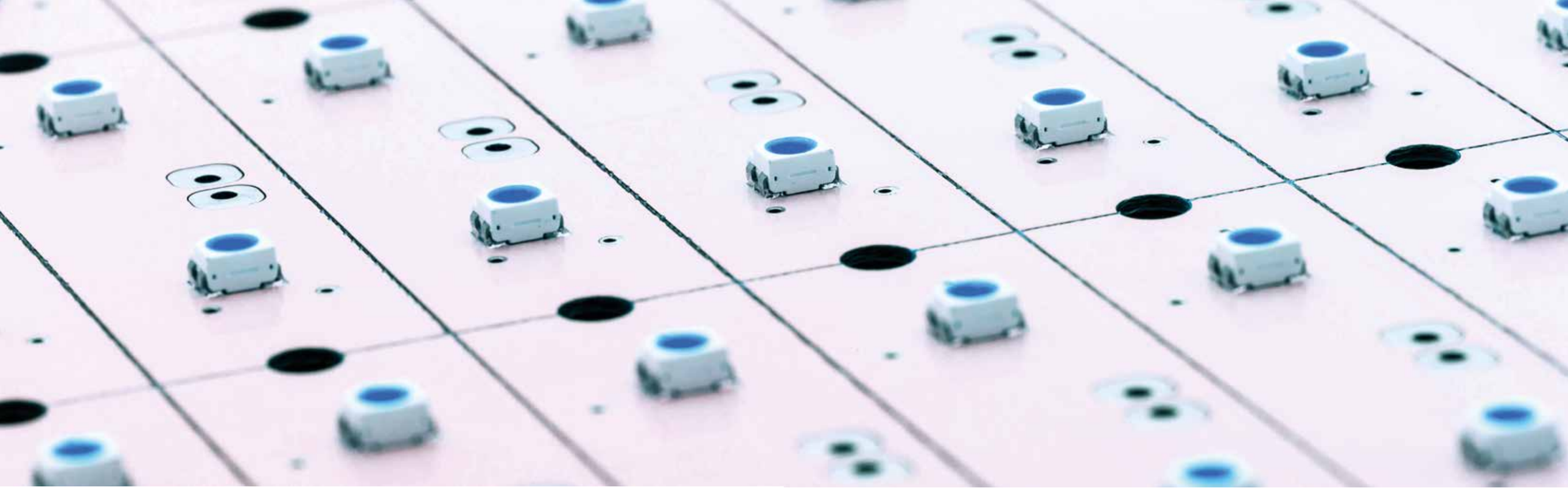
Light on the spot, reliable and accurate

The robogonio for signal light manufacturers.

For measuring traffic lights, railway signals, beacons, or signal towers for production, the luminous intensity distribution is essential. Some applications present the additional challenge of the front and back light exit windows having to emit the exact required quantity of light. Here, the robogonio impresses with its flexibility since it can measure the luminous intensity distribution in both directions using arbitrary centres of rotation in space. Standard-relevant testing areas, for example according to ICAO, FAA, and DIN EN 12368, are covered automatically.

By the way

For fast and efficient work, the robogonio enables integrating user-defined measuring processes as well as the numerous updates of standards.



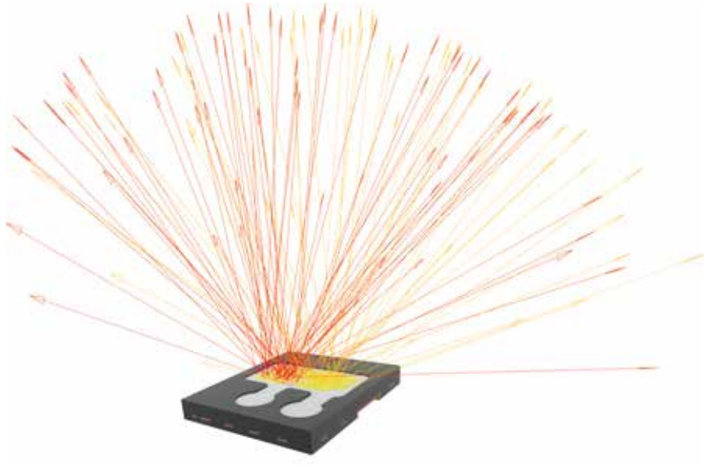
Realistic simulation of optical systems

The robogonio for optics development.

All lights are different – a dilemma with which many optics designers are familiar in the preliminary development. At the same time, the systems are getting smaller and smaller – the key word here is LEDs. When reliable ray data for optical simulations are needed, conventional solutions are limited. The robogonio measures light sources with a high-resolution luminance camera from 10,000 different angles. This leads to reliable near-field ray data that can be used in all standard optics simulation environments.

By the way

The robogonio is the only goniophotometer available that can do actual far-field and near-field measurements in one single instrument. Thus, the robogonio accompanies developers and producers from the first idea throughout the development and to the finished product.



Evolutionary

The right size for every task.

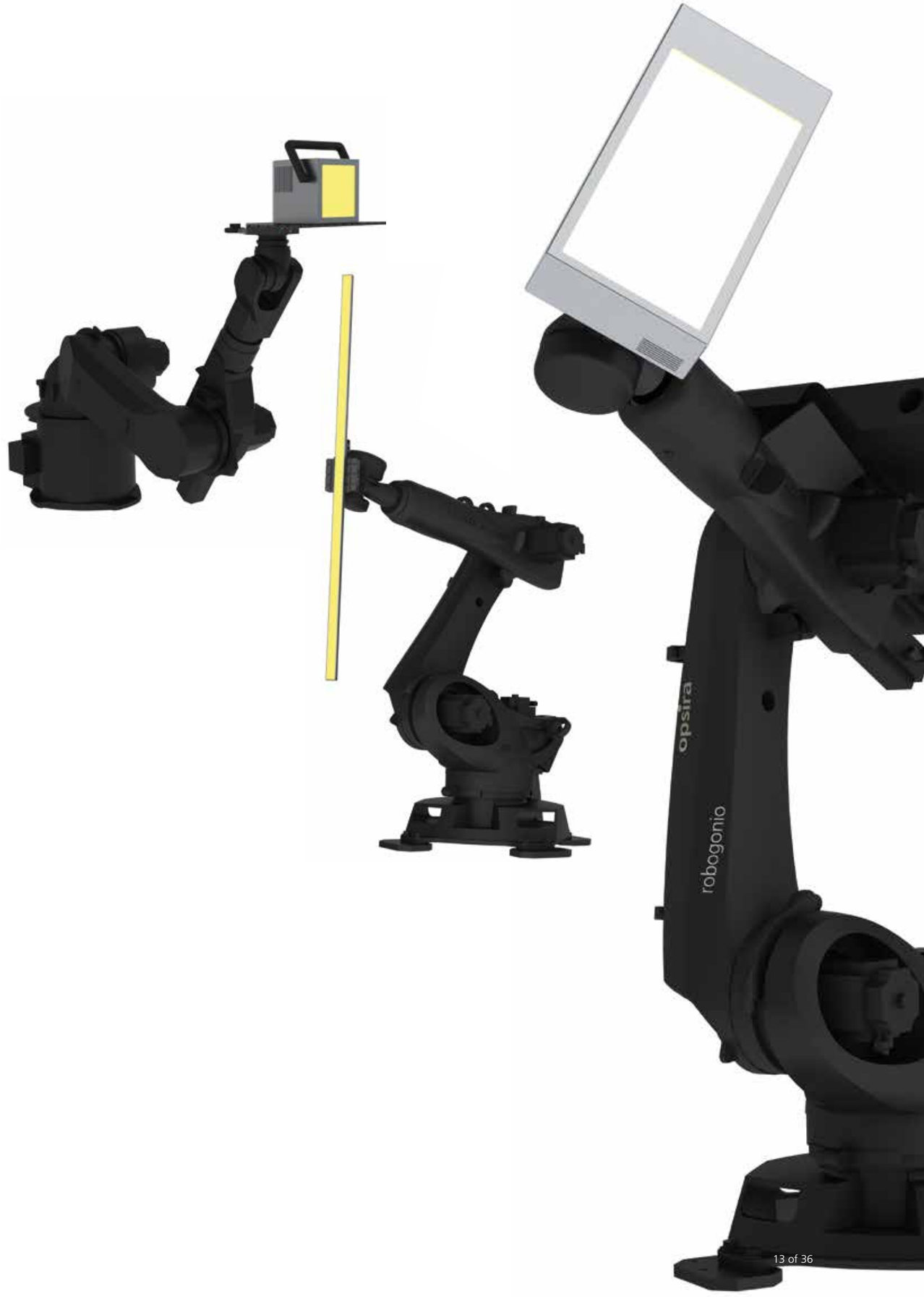
The robogonio is available in seven basic sizes for different payloads (6, 10, 16, 30, 60, 120 and 240 kg).

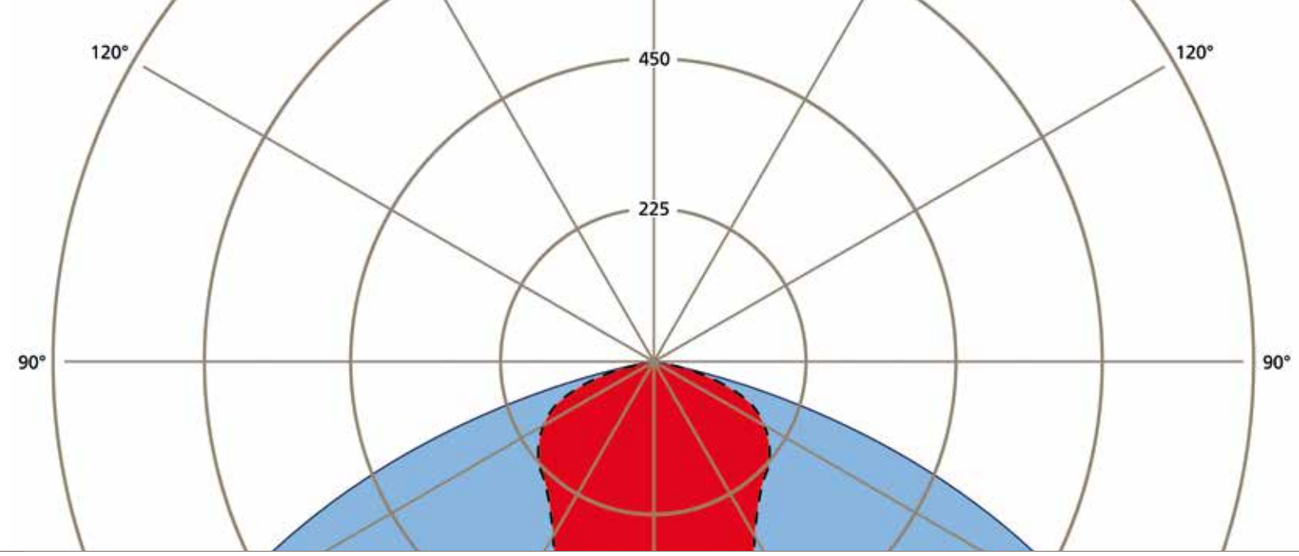
The smaller models are designed for measuring the luminous intensity distribution of luminaires and LED PCBs as well as for scanning illuminance distributions.

The larger models are suitable for systems such as street lights, stage lights, and headlights.

By the way

The sky's the limit – almost. Payload of up to 1,000 kg are possible upon request. Our experienced partner for robotics: KUKA Roboter GmbH.





The right model for every case

The robogonio - overview.

Type	mrg-6	mrg-10	mrg-16	mrg-30	mrg-60	mrg-120	mrg-240
Maximum payload * [kg]	6	10	16	30	60	120	240
Weight [kg]	52	54	235	665	665	1,049	1,104
Work envelope radius [mm] approx.	900	1,100	1,610	2,030	2,030	2,500	2,500
Position repeatability [mm]	±0.03	±0.03	±0.05	±0.05	±0.05	±0.06	±0.06
Angle repeatability [°]	±0.005	±0.005	±0.005	±0.005	±0.005	±0.006	±0.01
Detectors and measuring systems	frc'3-f radiometer/photometer frc'3-f-l high-end photometer (class L) frc'3-f-h auxiliary photometer according to DIN EN 13032-4 (warm-up phase) spec'3 spectrometer spr'3 spectroradiometer luca luminance camera system (monochrome) luca'color luminance camera system (color version) lmg power measuring device (electric) kls ambient conditions (temperature, pressure, humidity)						
Detector mounting	wall, floor, ceiling or rail system mounting						
Measurement data	Depending on the configuration: luminous intensity distribution (LID), luminous flux, colorimetric data (COA), luminance, glare rating, ray data, etc.						
Power supplies	A number of high-quality DC and AC laboratory power supplies that can be controlled directly from the software are available with robogonio.						

*Test pieces with high mass moments of inertia (e.g. very long test pieces) can lead to a reduction of the payload.

Configured as per your requirements

Detectors & co.

opsira detectors offer established quality and a great number of measurement options. From the classic luminous intensity distribution to high-precision ray data – configure the robogonio as per your requirements. The following configurations are available or can be combined.

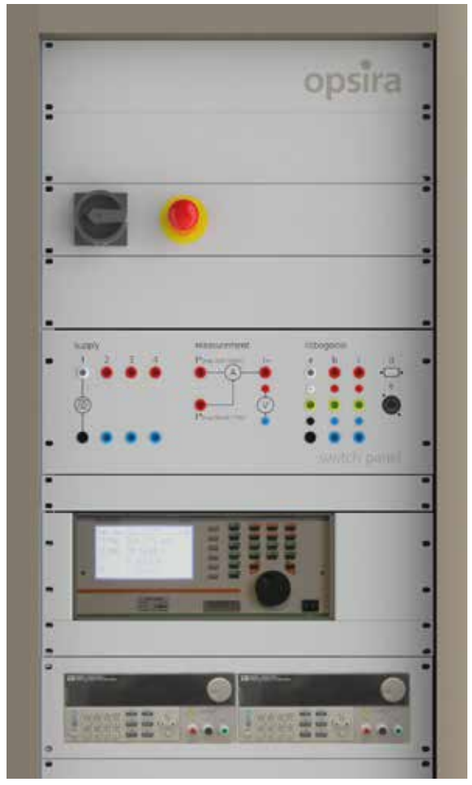
	Configuration	Detectors
-f	Goniophotometer (far field)	Photometer frc'3
-l	Goniophotometer (far field)	High-end photometer (class L) frc'3-f-l
-spr	Goniospectroradiometer	Spectroradiometer spr'3
-spc	Goniospectrometer	Spectrometer spec'3
-si	Ray data goniophotometer (near field)	Luminance camera luca
-sic	Ray data goniophotometer (near field, polychromatic)	Luminance and colorimetry camera luca'color and spectroradiometer spr'3
-rr	Goniophotometer system for measuring the retroreflexion	High-end photometer (class L) frc'3-f-l, projector
-h	Auxiliary photometer according to DIN EN 13032-4	Photometer frc'3 (small type)

Plan, install, get started

The robogonio all-in-one solution.

Perfectly configured electric control cabinet...

With the robogonio, you get an all-round carefree package. We plan and configure your measuring lab as per the respective requirements. The wide range of accessories includes integrated power supplies, power measuring devices, and the electrified mounting adapter for luminaires. Once the robogonio is installed and tested on site by opsira, it is immediately ready for use.



Typical electric control cabinet configuration

- Main operating switch module with emergency stop and release function
- Switch panel for easy connection of test pieces to supplies and electrical measuring equipment
- Drawer for measuring accessories
- Power supplies (DC)
- Power supplies (AC)
- robogonio control (only with mrg-6 and mrg-10 types)
- Control PC (19“ industrial PC)

...and an electrified mounting adapter.

For easy connection to the robogonio and direct testing of any kind of test piece, be it an elongated light guide, a signal light, or an LED, the mounting adapter is part of our system. It is intuitively operated and has an integrated power supply that eliminates the need for any further connections or cables.

Mounting adapter for supply of test pieces

- Slot system for easy installation of test piece
- 230 volt supply with ground contact
- Banana jacks with protective ground conductor
- SUB-D, 9-pole (D-SUB 9F or D-SUB 9S)
- RJ45 jack, UAE (universal connection unit) 8(8)

Photometer and auxiliary photometer

Flexible and powerful. frc'3.

Depending on the configuration, the photometer/radiometer frc'3 can measure light and radiation sources from ultraviolet to infrared quickly and efficiently.

When the frc'3 is equipped with an optional filter wheel, radiometric and photometric filtering is possible in one and the same device. Beside broadband radiometric filters or V(λ) filtering, other spectral adaptations can also be realized. The smaller auxiliary photometer frc'3-h is mounted on a test piece in such a way that it is stationary and rotates jointly with it. During the run-up period and the measuring process, it provides measuring values according to DIN EN 13032-4.

Typical band width (photometer)	350–830	nm
Measuring ranges	4	
Dynamic	100 mLux < E < 1 MLux or 10 cd < I < 100 Mcd	
Sensor	integral sensor	
Filter wheel positions (optional)	4	
Measuring values per second	0.8	
Linearity	< 0.3	%
Spectral adaptation f_1	< 4	%
Diffuser option	opaque fused quartz	
Assessment true to cos f_2 (with diffuser)	< 0.5	%
Instrument class (DIN EN 5032, T7)	A	
Dimensions (diameter, height)	Ø 68, height 60	mm
Weight	400	g

The high-end photometer

Highest precision. Quick scans. frc-f-l.

As the top model among the opsira photometers, the frc-f-l scans luminous intensity distributions very quickly and with excellent accuracy. It meets the requirements for the highest photometer class L and picks up photometric measuring values in the kilohertz range. The thermostated measuring head guarantees reproducible and reliable measuring results.

Typical band width (photometer)	350–830	nm
Measuring ranges	13 (autorange function)	
Dynamic	10 µLux < E < 10 kLux or 1 mcd < I < 1 Mcd	
Sensor	integral sensor	
Measuring values per second	max. 125,000	
Linearity	< 0.1	%
Spectral adaptation f_1	< 1.5	%
Diffuser option	opaque fused quartz	
Assessment true to cos f_2 (with diffuser)	< 0.5	%
Instrument class (DIN EN 5032, T7)	L	

The spectrometer

Quick and extensive. spec'3.

The spectrometer spec'3 enables the measurement of spectral power distributions from UV to NIR. Colorimetric values in the visible spectral range according to CIE are provided directly. In combination with the robogonio, the angular dependent color behaviour (color over angle) of light sources or luminaires can be measured quickly and easily.

Spectral distribution	$S(\lambda)$
Color coordinates	x, y / u', v' / L*a*b*
Color temperature	T, T_n [K]
Color rendering indices	R_1–R_8, R_a, R_9–R_{14}
Color saturation	S [%]
Button angle	h [°]
Dominant wavelength	λ_d
Transmittance	T (λ) [%] (specular, diffuse)
Reflectance	R (λ) [%] (specular, diffuse)
Wavelength bands	any bands between 180 nm and 2,500 nm possible
Pixel count of detector	approx. 2,048
A/D converter	16 bit/1 MHz
Wavelength resolution	0.03 nm to 10 nm FWHM
Measuring dynamics	2 x 10^8 (system), 1,300:1 (individual measurement)
Linearity	> 99.8 %
Scatter light suppression	0.05 % @ 600 nm/0.10 % @ 435 nm
Integration times	1 ms to 65 s

The spectroradiometer

Complete solution for light and color. spr'3.

Providing the luminous or radiant intensity and the absolute spectral distributions, the spectroradiometer spr'3 makes the robogonio a complete solution for light and color.

By the way:
The spectroradiometer spr'3 can also be used as a stand-alone instrument for measuring illuminances, color temperatures, or color rendering indices.

Band width	variable in the range between 300–900	nm
Wavelength resolution	0.03 nm–10 nm FWHM	nm
Integration time	1–20,000	ms
Measuring dynamics (spectrometer)	$2 \cdot 10^8$; 1,300:1 (individual measurement)	
Linearity (spectrometer)	> 99.92	%
Scatter light (spectrometer)	0.05 % @ 600 nm, 0.1 % @ 435 nm	
Detector (spectrometer)	Si CCD Array	
Measuring ranges (radiometer)	4	
Sensor (radiometer)	integral silicone sensor	
Linearity (radiometer)	> 99.7	%
Spectral adaptation	negligible due to spectral correction	
Diffuser option	opaque fused quartz	
Assessment true to cos f_2 (with diffuser)	< 0.5	%
Instrument class (DIN EN 5032, T7)	A	
Dimensions (WxDxH)	125 x 85 x 125	mm
Weight	1.3	kg

The luminance camera

High dynamics and flexibility. luca.

The spatially resolving luminance camera luca measures the luminance distribution on small light sources or large luminaires. Thanks to the high dynamics of around six magnitudes, luca measures low-luminance objects (few cd/m²) as well as strong light sources such as high-pressure discharge lamps quickly and easily. Depending on the requirements, the cameras are provided cooled and with LINOS/Rodenstock precision objectives. They work in 12-bit or 18-bit mode (software-supported).

Measuring range	200 mcd/m²–1.2 Mcd/m²
Integration time	0.1 ms–2 s (cooled up to 10 s)
Binning mode	single to double
Digitalization depth	12 bit
Measuring dynamics	63 dB (cooled up to 66 dB)
Photometric adaptation	V(λ), f_1 < 4 %
Linearity error	f_3 < 0.6 %
Measurement uncertainty of luminance	4 % @ 3,200 K
Luminance repeatability	< 0.6 %

The color camera

Luminance and color distribution. luca'color.

Beside the luminance, the luminance and colorimetry camera luca'color measures the spatially resolved color distribution – but not in a punctual manner as in a standard colorimeter, but areal and in a single shot. luca'color is equipped with an integrated filter wheel with ten positions and enables the direct measurement of color values according to CIE.

Measuring range	200 mcd/m²–1.2 Mcd/m²
Integration time	0.1 ms–2 s (cooled up to 10 s)
Binning mode	single to double
Digitalization depth	12 bit
Measuring dynamics	63 dB (cooled up to 66 dB)
Number of filters	up to 10 filter positions are available
Photometric adaptation	V(λ), f_1 < 4 %
Colorimetry	Tristimulus adaptation, X(λ) f_1 < 7 %, Z(λ)f_1 < 7 %
Linearity error	f_3 < 0.6 %
Measurement uncertainty of luminance	4 % @ 3,200 K
Measurement uncertainty x, y, CIE1931	@ 3,200 K +/- 0.004
Luminance repeatability	< 0.6 %
Repeatability x, y, CIE1931	+/- 0.0004

A wide range of accessories

Options for every requirement.

Electrics and mechanics

Control cabinet robogonio ≤ 10 kg payload: W483 mm x H271 mm x D460 mm (integrated in main electric control cabinet) > 10 kg payload: W792 mm x H960 mm x D558 mm
Main electric control cabinet: W600 mm x H1,800 mm x D810 mm
Measuring screen (various sizes, stationary, pivoting, or extendible)
Traversing rail for detectors or robogonio
Mounting adapter
Tripod or wall mounting unit for detectors
Safety components (e.g. safety laser scanner)
Set-up stands in different sizes for ideal positioning of the robogonio
Cross-laser modules for easy set-up
Scatter light tubes (7:1, 10:1, 20:1)

Detectors

OTS-FRC-F-A	Photometer for measuring the luminous intensity distribution (LID)
OTS-FRC-F-L	High-end photometer (class L) for quick scans
OTS-FRC-F-H	Auxiliary photometer according to DIN EN 13032-4 (warm-up etc.)
OTS-FRC-F-R	Radiometer for measuring the radiant intensity distribution (RID)
OTS-SMS-SP3-x	Spectrometer
OTS-SMS-SPR3	Spectroradiometer
OTS-LMS	Luminance camera (uncooled)
OTS-LMS-C	Luminance camera (cooled)
OTS-LMS-COLXYZ	Luminance and colorimetry camera (cooled), CIE1931 XYZ

DC – High resolution and accuracy	Voltage	Current	Power
OTS-LSV-DC-300	0–20 V	0–5 A	100 W
OTS-LSV-DC-301	0–32 V	0–3 A	96 W
OTS-LSV-DC-302	0–72 V	0–1.2 A	86 W
More models up to:	0–60 V	0–2.5 A	150 W
DC – 3 channel			
OTS-LSV-DC-310	0–30/30/5 V	0–3 A	195 W
OTS-LSV-DC-311	0–30/30/5 V	0–3 A	195 W
OTS-LSV-DC-312	0–30/30/5 V	0–6/3 A	375 W
OTS-LSV-DC-313	0–60/60/5 V	0–3 A	375 W
DC – Constant voltage, current, and power supplies (autorange)			
OTS-LSV-DC-320	0–80 V	0–60 A	1,200 W
OTS-LSV-DC-321	0–80 V	0–60 A	1,200 W
OTS-LSV-DC-322	0–150 V	0–30 A	1,200 W
Further models up to:	0–160 V	0–120 A	6,000 W
DC – High-performance constant voltage and current supplies (autorange)			
OTS-LSV-DC-330	0–60 V	0–5 A	100 W
OTS-LSV-DC-331	0–60 V	0–10 A	200 W
OTS-LSV-DC-332	0–60 V	0–15 A	360 W
Further models up to:	0–150 V	0–10 A	600 W
AC – Linear voltage supplies			
OTS-LSV-AC-040	0–150/300 V	3/1.5 A	300 W
OTS-LSV-AC-030	0–150/300 V	6/3 A	750 W
OTS-LSV-AC-020	0–150/300 V	12/6 A	1,500 W
OTS-LSV-AC-010	0–150/300 V	24/12 A	3,000 W
Power measuring devices			
OTS-Z-LMG95E	High-precision power measuring device, basic precision 0.11 %		
OTS-Z-LMG95	Highest-precision power measuring device, basic precision 0.03 %		
Environment measuring devices			
OTS-Z-KLS	Measurement of temperature, atmospheric humidity and pressure		

Adaptive and powerful

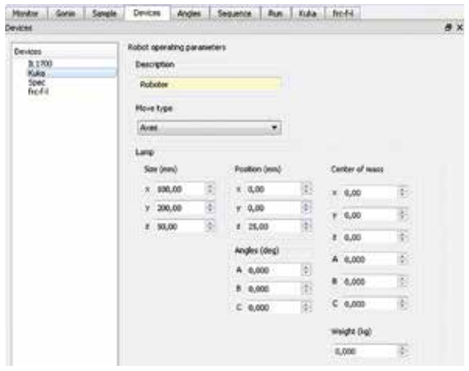
Software and reporting functions.

Operation, user-defined processes, and visualization.

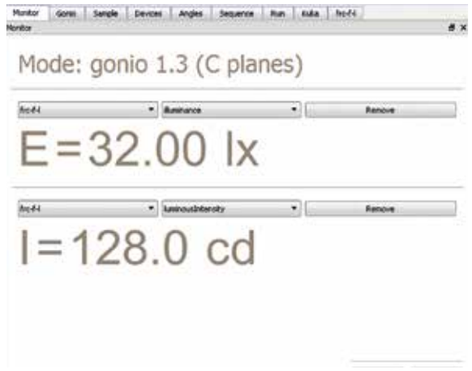
- All opsira goniophotometer applications and all components can be operated directly using the gonio software.
- The software supports measurements in various coordinate systems. These include C-planes, B-planes, and Cartesian coordinates (scanning).
- Configured in XML, it allows calling up pre-defined measurements and creating user-defined processes.
- Before starting a measurement, it is visualized in a simulation.
- gonio provides the measuring results as raw data, for example in csv format, or as reports in PDF files.
- The light distribution can be exported in IES and EULUMDAT file format.

By the way

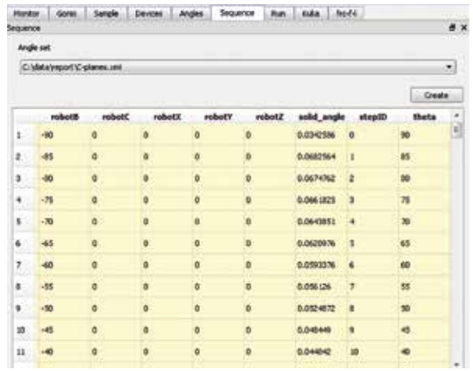
Of course, the robogonio software also provides safety. The implemented collision control makes sure that the interaction between test piece, space, and the robogonio functions smoothly.



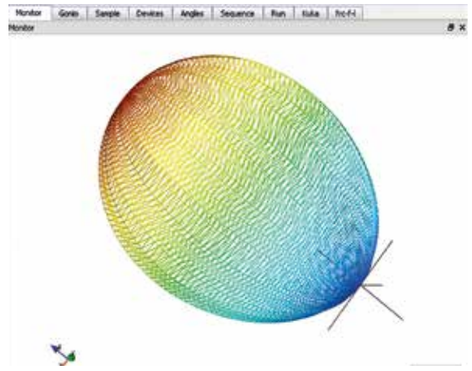
Every instrument, whether goniophotometer, detector system, or auxiliary sensor system, is easily configured with separate setting menus.



Freely configurable large displays for every measuring quantity.



All measuring parameters and quantities are directly available in clearly laid out tables.



The luminous intensity or illuminance distributions can be visualized in various evaluation graphs. Depending on the application, specific test reports are generated directly in PDF format.

The goniophotometer that can do everything

Measuring applications - overview

Measuring application	Measuring quantities
Luminous intensity distribution in far field of general lighting (gonio type 1.3, C-planes)	luminous intensity distribution far-field data (e.g. EULUMDAT, IES) total flux/partial flux/utilized flux medium luminance spatially resolved, angular dependent luminance luminous flux efficiency luminaire light output ratio
Illuminance distribution of headlights (gonio type 1.1, A-planes)	illuminance distribution total flux/partial flux/utilized flux luminous flux efficiency luminaire light output ratio
Luminous intensity distribution of luminaires or signal transmitters (gonio type 1.1, A-planes)	luminous intensity distribution/luminous ranges total flux/partial flux/utilized flux medium luminance spatially resolved, angular dependent luminance ghost light luminous flux efficiency luminaire light output ratio
Radiant intensity distribution in far field	radiant intensity distribution total radiant flux
Illuminance distribution or luminous intensity distribution (camera-based)	illuminance distribution on a plane luminous intensity distribution on a plane
Measurement of angular dependent luminance (camera-based) e.g. for displays and other illuminating optics	minimum and maximum luminance of luminaires glare calculation spatially resolved, angular dependent luminance/contrast
Spectral power distribution in the far field	angular dependent absolute spectra (IR, VIS, and UV) ang. dep. chromaticity coordinates (X, Y, Z; x, y; u, v; u', v'; L*a*b; Lab99) angular dependent color temperature angular dependent color rendering indices
Measurement of ray data (near-field goniophotometry)	ray data (monochromatic/polychromatic)
Scanning of planes and other shapes (near field)	illuminance distributions radiant intensity distributions luminance distributions

Detailed planning & safety

We keep an eye on everything.

Planning from A to Z.

opsira attaches great importance to counselling and accompanying its customers as a partner. Unlike mere product suppliers, we provide a custom-fitted and ready-for-use system. We look at the actual conditions on site, create a 3D-CAD plan, and deliver your robogonio once it is finished. Your system will be set up, installed, and calibrated by us.

By the way

Cross-laser modules make the alignment of the luminaires during operation quick and intuitive. Thereafter, the robogonio maintains the centre of rotation in space with high precision.

A safe working environment with robogonio.

Naturally, safety is a topic that is very important to us. The directives for operating a robogonio are exactly the same as for conventional goniophotometers. These are all defined by the standard DIN EN ISO 12100 (Safety of Machinery) or the Product Safety Act.

The robogonio either comes with a CE declaration of incorporation, or opsira will help you to implement this standard. On request, we issue an EC declaration of conformity for your installation.

Specifications for an EC declaration of conformity

Risk assessment according to machinery directive
Preparation of the safety concept
Verification of the reached performance level
Verification of the user manual
Compilation of checklists
Safety inspection of the system
Final report
Issuing of the EC declaration of conformity

Calibration, training, support

We are pleased to support you.

Calibration and after-sales support – whatever you need.

The initial calibration of the robogonio is part of the initial set-up of the system that we effect on site. After that, our service packages guarantee high and permanent reliability. Typically, the service takes place once a year and includes, among other things:

- checking the alignment of the entire system
- checking the angular accuracy of the goniophotometer
- calibrating the photometer
- checking the safety of the system

If your light-measuring section is equipped with a luminance camera or a spectral measuring system, they are to be sent to opsira before the service date. These components are then calibrated in the opsira calibration lab and are, as part of the service work, reintegrated in your system. This way, downtime is limited to a few days.

If you wish for or require a TÜV calibration, this can be effected according to the latest requirements, also according to GTB.

By the way

The robogonio is based on a multifunctional and modular concept. Therefore, it is no problem at all to add more functions later, such as near-field goniophotometry for generating ray data.

On site or in the opsira light lab – training courses for every requirement.

For quick and efficient work with the robogonio, we offer various training modules. Team training is possible on our in-house opsira demo system before your own robogonio is delivered. On the other hand, we also offer a basic training course on site, which takes place when your robogonio has been set up. Both options aim to familiarize all employees with basic topics such as goniophotometric measurements, the measurement of luminous intensity distributions and/or ray data, implementation of software and how to evaluate the results.

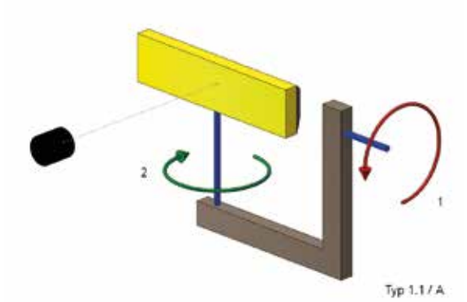
The advanced training takes place four to eight weeks after the basic module as a follow-up course. Here, we will cover all pending questions that have come up regarding the first measurements and give the users deeper insight into the possibilities the robogonio has to offer.

By the way

We also offer basic training courses on the topics of general photometry, colorimetry, and optical measurement technique.

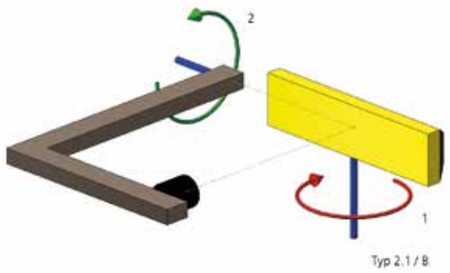
Goniophotometry

Old and new.



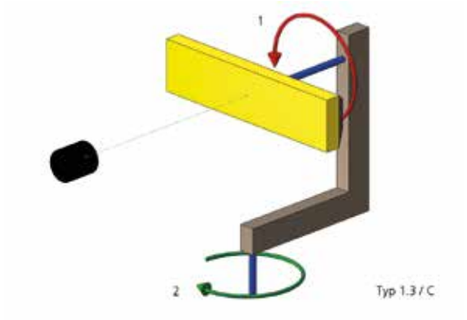
Conventional: Goniophotometer Type 1.1, A-planes

robogonio: Goniophotometer Type 1.1, A-planes



Conventional: Goniophotometer Type 2.1,
A- or C-planes

robogonio: Goniophotometer Type 2.1



Conventional: Goniophotometer Type 1.3, C-planes

robogonio: Goniophotometer Type 1.3, C-planes

More flexibility for your measurements

For all types of goniophotometers, the robogonio moves the luminaire in the same way as any conventional goniophotometer. Due to its flexibility in space, however, the length and width of the test piece can be freely selected, as well as the centre of rotation in space. So the system presents new measuring possibilities, including the scanning of geometries or elongated light guides.

robogonio: scanning geometries in space

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